

AMENDMENTS TO THE CLAIMS

1. (Original) A speech coding apparatus for coding an input speech on a frame-by-frame basis using an adaptive excitation source, which is generated from a past excitation source, and a driving excitation source, which is generated from the input speech and the adaptive excitation source, so as to generate speech code, said speech coding apparatus comprising:

a repetition period pre-selecting means for generating a plurality of candidates for a repetition period of the driving excitation source by multiplying a repetition period of the adaptive excitation source by a plurality of constant numbers, respectively, and for pre-selecting a predetermined number of candidates from all the candidates generated and furnishing the predetermined number of pre-selected candidates;

a driving excitation source coding means for providing both excitation source location information and excitation source polarity information that minimize a coding distortion, for each of the predetermined number of candidates for the repetition period of the driving excitation source, and for providing an evaluation value associated with the minimum coding distortion for each of the predetermined number of candidates; and

a repetition period coding means for comparing the evaluation values provided for the predetermined number of candidates for the repetition period of the driving excitation source from said driving excitation source coding means with one another, for selecting one candidate from the predetermined number of candidates according to a comparison result, and for furnishing selection information indicating a selection result, excitation source location code indicating excitation source location information associated with the

selected candidate for the repetition period of the driving excitation source, and polarity code indicating excitation source polarity information associated with the selected candidate.

2. (Original) The speech coding apparatus according to Claim 1, wherein said repetition period pre-selecting means pre-selects two candidates from all the candidates generated, and said repetition period coding means encodes the selection result in one bit so as to generate 1-bit selection information.

3. (Original) The speech coding apparatus according to Claim 1, wherein said repetition period pre-selecting means includes a means for comparing the repetition period of the adaptive excitation source with a predetermined threshold value, and for pre-selecting the predetermined number of candidates from all the candidates generated according to a comparison result.

4. (Original) The speech coding apparatus according to Claim 1, wherein said repetition period pre-selecting means includes a means for generating a plurality of other adaptive excitation sources whose respective repetition periods equal to the plurality of candidates for the repetition period of the driving excitation source, respectively, and for pre-selecting the predetermined number of candidates from all the candidates generated according to a comparison between distances among the plurality of other adaptive excitation sources generated.

5. (Original) The speech coding apparatus according to Claim 1, wherein said plurality of constant numbers, by which the repetition period of the adaptive excitation source is multiplied, includes $1/2$ and 1.

6. (Original) A speech decoding apparatus for decoding input speech code on a frame-by-frame basis using an adaptive excitation source, which is generated from a past excitation source, and a driving excitation source, which is generated from the input speech code and the adaptive excitation source, so as to reconstruct original speech, said speech decoding apparatus comprising:

a repetition period pre-selecting means for providing a plurality of candidates for a repetition period of the driving excitation source by multiplying a repetition period of the adaptive excitation source by a plurality of constant numbers respectively, and for pre-selecting a predetermined number of candidates from all the candidates generated and furnishing the predetermined number of pre-selected candidates;

a repetition period decoding means for selecting one candidate from the predetermined number of pre-selected candidates for the repetition period of the driving excitation source from said repetition period pre-selecting means according to selection information included in said input coded speech and indicating the selection, and for furnishing the selected candidate as the repetition period of the driving excitation source;
and

a driving excitation source decoding means for generating a time-series signal according to excitation source location code and excitation source polarity code included in the input speech code, and for generating a time-series vector that is a series of pitch-cycles, each of which includes the time-series signal, using the repetition period of the driving excitation source from said repetition period decoding means.

7. (Original) The speech decoding apparatus according to Claim 6, wherein said repetition period pre-selecting means pre-selects two candidates from all the candidates generated, and said repetition period decoding means decodes selection information coded in one bit, which is included in the input speech code and indicates a selection of a candidate for the repetition period of the adaptive excitation source made during coding.

8. (Original) The speech decoding apparatus according to Claim 6, wherein said repetition period pre-selecting means includes a means for comparing the repetition period of the adaptive excitation source with a predetermined threshold value, and for pre-selecting the predetermined number of candidates from all the candidates generated according to a comparison result.

9. (Original) The speech decoding apparatus according to Claim 6, wherein said repetition period pre-selecting means includes a means for generating a plurality of other adaptive excitation sources whose respective repetition periods equal to the plurality of candidates for the repetition period of the driving excitation source, respectively, and for

pre-selecting the predetermined number of candidates from all the candidates generated according to a comparison between distances among the plurality of other adaptive excitation sources generated.

10. (Original) The speech decoding apparatus according to Claim 6, wherein the plurality of constant numbers, by which the repetition period of the adaptive excitation source is multiplied, includes $1/2$ and 1.

Claims 11-12 (Canceled)

13. (Original) A speech coding apparatus for coding an input speech on a frame-by-frame basis using an adaptive excitation source, which is generated from a past excitation source, and a driving excitation source generated from the input speech and the adaptive excitation source, said driving excitation source being represented by locations and polarities of a plurality of excitation sources, so as to generate speech code, said speech coding apparatus comprising:

an excitation source location table including a plurality of selectable possible locations and a fixed magnitude determined based on the number of the plurality of possible locations for each of the plurality of excitation sources;

a driving excitation source coding means for placing the plurality of excitation sources at respective possible locations while multiplying each of the plurality of excitation sources by a corresponding fixed magnitude, with reference to said excitation

source location table, for generating a driving excitation source by calculating a sum of the plurality of excitation sources each of which has been multiplied by the corresponding fixed magnitude and is thus placed at one corresponding possible location, for each of all combinations of possible locations of the plurality of excitation sources, and for selecting possible locations and polarities of the plurality of excitation sources which provide a driving excitation source having a smallest coding distortion between itself and the input speech so as to generate excitation source location code and polarity code.

14. (Original) A speech decoding apparatus for decoding input speech code on a frame-by-frame basis using an adaptive excitation source, which is generated from a past excitation source, and a driving excitation source generated from the input speech code and the adaptive excitation source, said driving excitation source being represented by locations and polarities of a plurality of excitation sources, so as to reconstruct original speech, said speech decoding apparatus comprising:

an excitation source location table including a plurality of selectable possible locations and a fixed magnitude determined based on the number of the plurality of possible locations for each of the plurality of excitation sources;

a driving excitation source decoding means for selecting respective possible locations for the plurality of excitation sources with reference to said excitation source location table based on excitation source location code included in the input speech code, for placing the plurality of excitation sources at the respective selected possible locations

while multiplying each of the plurality of excitation sources by a corresponding fixed magnitude, and for generating a driving excitation source by calculating a sum of the plurality of excitation sources each of which has been multiplied by the corresponding fixed magnitude and is thus placed at the corresponding possible location.

15. (Previously presented) A speech coding apparatus for coding an input speech on a frame-by-frame basis using an adaptive excitation source, which is generated from a past excitation source, and a driving excitation source generated from the input speech and the adaptive excitation source, said driving excitation source being represented by locations and polarities of a plurality of excitation sources, so as to generate speech code, said speech coding apparatus comprising:

a pre-table calculating means for calculating a correlation between a signal to be coded and each of a plurality of synthesized speeches each of which is generated based on a corresponding temporary driving excitation source that is a signal obtained by placing a predetermined excitation source at a corresponding one of all possible locations, and a cross-correlation between any two of the plurality of synthesized speeches, and for storing these calculated correlations and cross-correlations as a pre-table therein;

a pre-table modifying means for calculating a correlation between the signal to be coded and a synthesized speech generated based on the adaptive excitation source, and a correlation between each of the plurality of synthesized speeches generated based on the corresponding temporary driving excitation source and the synthesized speech generated

based on the adaptive excitation source, and for modifying said pre-table using these calculated correlations; and

a searching means for determining the locations and polarities of the plurality of excitation sources using the pre-table corrected by said pre-table modifying means so as to generate excitation source location code indicating the locations of the plurality of excitation sources and excitation source polarity code indicating the polarities of the plurality of excitation sources.

Claims 16-20 (Canceled)

21. (Previously presented) The speech coding apparatus of claim 15, wherein the signal to be coded is at least one of: the input speech, and a synthesized signal generated from the input speech.

Claims 22-30 (Canceled)